PDS-30 Instruction Guide
Digital Power Supply Unit for LED Lights

Safety Precautions

*Please read this instruction guide before using the product.

Thank you for purchasing PDS Power Supply for LED lights. Please read this Instruction Guide carefully before using the product, and follow its instructions to ensure safe operation. We also recommend keeping this Instruction Guide together with the product for future reference.
Be sure to pay special attention to the information marked with "⚠ Danger," "⚠ Warning," or "⚠ Caution". The information is provided to prevent injury, electric shock and other damages.

Indication symbols
This instruction guide contains following symbols which indicate precautions in order to prevent injury or property damages. To ensure safe operations, please adhere to the information provided in this instruction guide.

⚠ Danger	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury, as well as severe property damage.
⚠ Warning	Indicates incorrect usage may result in serious injury or death.
⚠ Caution	Indicates incorrect usage may result in injury or equipment damage.

Examples of indication symbols

	△ Symbols indicate caution (also including danger and warning). Specific examples are shown in the diagram (A diagram on the left indicates electric shock warning).
	⃠ Symbols indicate prohibition. Specific examples are shown in the diagram. (A diagram on the left indicates prohibition to disassemble)
	● Symbols indicate instruction for specific actions. Specific examples are shown in the diagram. (A diagram on the left indicates unplugging a power cord)

Danger

Please read this instruction guide carefully before using the product.
Following personnel should not handle this product.

1. A person who does not understand the contents of this instruction guide.
2. A person who does not have enough electrical equipment knowledge of at least vocational school level.
3. A person who is under influence of illegal substances.
4. A person who is under influence of alcohol.
5. A person who uses a pace maker in the heart.
6. A person who is mentally disturbed.
7. A person who is a blind or a color blind.

Please do not attempt to perform any repairs.
This may result in electric shock or other hazardous situation.
Please contact CCS when repair is needed.

Please do not modify the products.
This may result in electric shock or other hazardous situation including fire.

If abnormal condition occurs such as fuming, product high temperature, smell, noise, or so on, stop using the product immediately, and turn the power off.
Then contact CCS for inspection and repair.

If the product is under following condition, please stop the usage immediately, turn the power off, and unplug;
- exposed to high impact by dropping
- damaged
- foreign materials or water entered in the product

Then contact CCS for inspection and repair.

Warning

Do not open the cover of the product.
Otherwise, electric shock may occur due to high voltage parts.

Please use the product within electricity specifications.
Otherwise it may cause fire and/or electric shock.
Please unplug the power cord when connecting or disconnecting the product and peripherals.
Do not damage power cord or place any heavy objects on it. There are risks of damaging the cord, which may result fire or electric shock.

Do not touch the terminals, plugs or switches with wet hands.
This may result in electric shock.

Always ground the power cord.
If not grounded, it may result in electric shock.

Do not look into the LED light directly. LED light is not as strong as semiconductor lasers. However, avoid looking directly into any bright light or looking directly at the light for an extended period while strobe. To do so may affect adversely to eyes.

Please use electricity within the product specification (PDS-30:AC100-240V, 50/60Hz).
Otherwise, it may cause fire or electric shock.

Please avoid following conditions to power cord;
Damaging, bending, twisting, pulling, heating, modifying, and putting heavy objects or heavy weight on it. When unplugging, please pull plug itself, not power cable.
It may cause power code damage, and fire and electric shock)

Before moving products, disconnect power cords and other cables.
Damaging the cables may result in fire or electric shock.
Unplug the power cord while the product is not used for an extended period of time, will ensure safety.

Please clean plug electrodes well more than once a year. Dust in the area may cause fire.
When cleaning the casing of the product, please turn the power off then unplug. Please use dry cloth to clean the electrode.

If you touch this product simultaneously with any other electric products which have different electrical potential from this product, this may result in electric shock. Therefore, please ground from FG connector with 0.5 to 1.25 sq (AWG20 to AWG 16) wires. If those equipments other than this product is not grounded but has electrical potential, It may be safer to connect FG connectors of both products together.
Please ground PDS-30 with 3P grounding electrode power cord.

This product operates at a power supply voltage of 100 to 240V AC. The power cord which is supplied with this product is for 100V. If the product is to be used at 200V or above, please use an appropriate powers cord.

Do not use when dew is formed on the products.
If dew is formed, please dry the equipment thoroughly before usage.

When rubber feet are removed to mount this product in a system rack or case, the portion of the M3 screws penetrating the case must be less than 2 mm long. If the insertion is longer than 2mm, internal components may be short-circuited.
Please use this product on a stable surface with minimal vibration. A surface with rubber pieces should be facing down.

Do not touch the power cords or connect peripheral devices during lightning.
Doing so may result in electric shock.

Caution

Turn the power off when connecting and disconnecting cables.
Otherwise it may result in fire and/or electric shock.

Please install product to locations in following conditions:
- In a flat and stable location with minimal vibration.
- Well-ventilated places with minimal dust.
- Place free from any water, oil, liquid, chemical, or steam.
- Place free from corrosive or combustible gas.
- Place away from water faucets, boilers, humidifiers, air conditioners, heaters, or stoves.
- Place that are not subject to sudden temperature changes.
- Place where products can be grounded.

Please do not place any object on the product.

Always provide a dedicated electric power source with stable voltage.
Sharing the electric power source with other power devices, such as inverters, motors, and so on, may cause product malfunction.

Bundling the camera cable and power cord together may cause screen problems.

Set light intensity to maximum at high shutter speeds such as 1/4000 s. When light intensity is set to maximum, we recommend intermittent use in external control or other modes.

Please use control input cable within specification of contact compliant cable. The longer the cable is, easier the cable picks up noise. Shielded cable within 3m is recommended.

When using lights without cooling fan, please use intermittently in order to minimize temperature rise.

When the unit is used in any of the following conditions, please use the product well below rated capacity and functions. Please also consider failsafe or better safety measures. You are encouraged to contact CCS for further discussion.

- Usage under conditions or in an environment not described in this Instruction guide.
- Usage in nuclear power control, railways, aircraft, vehicles, combustion equipment, medical applications, amusement devices, or safety devices.
- Usage in which there is a significant and foreseeable risk to life and property, particularly applications demanding a high level of safety.

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1. Features

1-1 This product is a digital power supply for controlling CCS LED lights.
1-2 Selectable 12V DC and 24V DC output (cannot be used simultaneously).
1-3 Both continuous and strobe operation are available.
1-4 A PLC or a computer can control the power supply externally through RS-232C or parallel signal.

The DIP switches, on the front panel, enable to change lighting mode, an external control interface, and etc.

■ Mode Selector Switch

No.	ON	OFF	Description
1	Strobe	Cont	Light mode selector Strobe: Strobe light synchronized to an external trigger input Cont: Continuous light at a pulse width of 50 kHz
2	Remote	Manual	Remote control enabled/disabled Remote: External control by RS-232C or bit-parallel signal. Manual: Light control by panel switch settings
3	RS-232C	Parallel	Remote control mode selector RS-232C: Light control by commands sent via serial communications fixed at 9,600 bps Parallel: Light control by a bit-parallel signal like an open collector signal
4	Trig+	Trig -	Strobe trigger polarity selector Trig +: Applies the strobe trigger on the positive edge in the LOW-to-HI transition. Trig -: Applies the strobe trigger on the negative edge in the HI-to-LOW transition.
5	ON/OFF+	ON/OFF -	ON/OFF polarity selector for continuous light ON/OFF +: Lighting turns ON at HI. ON/OFF -: Lighting turns ON at LOW.
6	Delay	Intensity	Selector for fine rotary dial functions Delay: Switch for light delay settings Intensity: Switch for fine light control

● Factory settings: Only # 5 is ON and the others are OFF.
● Turn the power off before changing mode switch settings.

2. Specifications

2-1 Specifications

Model	PDS-30
Input voltage	100 to 240V AC
Input power	46W 110VA max. (at 100V AC)
Frequency	50/60Hz ±10%
Inrush current	50A max. (at 100V AC)
Leakage current	0.75mA max.
Output voltage	By selecting output selector switch, either 12V or 24V lights may be connected. Continuous Light: 12.0 ± 0.1V or 24.3 ±0.2V Strobe Light: 18 ± 1V or 48 ± 1V
Output power	30W max.
Mode selection	DIP switches on the front panel
Control method	Continuous Light: Pulse duty control Frequency (50kHz) Strobe Light: pulse width and pulse duty, AND type
Light control	Manual: Front panel rotary switch Remote: RS-232C (9-pin D-Sub) or Bit-parallel signal (15-Pin D-Sub) Resolution : Continuous Light (256levels) Strobe Light (128levels)
Input-output control	Terminal block: Strobe trigger, Constant light ON/OFF 15-pin D-Sub: Light control date input (8 bit), Writing signal, Trigger, ON/OFF input non-insulated, Internally pulling up to +5 V power supply by resistance, Light emitting output timing, Trigger delay output (Nte3) Input level: 5V CMOS input, Pull up 4.7k, -0.5 to +5.5V max.
RS-232C	Pulse duty control, Strobe light pulse width, Strobe light pulse delay, Trigger Output Delay (Nte3) Data bit length: 8 bits, Stop bits: 1 bit, Parity check: None, Baud rate: 9,600 bps fixed.
Output connector	SMP-02V-BC (mfd. by JST) 1:OUT+(+12V), 2:OUT- SMP-03V-BC (mfd. by JST) 1:OUT+(+24V), 2:NC, 3:OUT- SMP-04V-BC (mfd. by JST) 1:OUT+(+24V), 2:OUT+(+12V), 3:OUT-, 4:Fan GND
Insulation	Between input and output connectors, between input connector and frame ground: 500V DC, 20 M min Between output connector and frame ground: 50V DC, 10 M Ω min
Dielectric	Between input and output connectors, between input connector and frame ground: 1,500V AC for one minute (10mA)
Operating environment	- Temperature: 0 to 40 °C, humidity: 20 to 85%RH (with no condensation) - Altitude: 2,000 m max. - Protective ground class I - Pollution level: 2 - Installation category II (restricted to use in indoor environments)
Storage environment	Temperature: -20 to 60°C, humidity: 20 to 85%RH (with no condensation)
Applicable standards	LVD: EN61010-1 EMC: EN61000-6-2, EN61000-6-4
Cooling method	Natural air cooling
Dimensions(Nte2)	W62 x H110 x D170 mm
Weight	1.2 kg max.

Notes

1: The operating voltage range is 85 to 264V AC of the input voltage.

2: Product items such as the switch, latch and stand are not included.

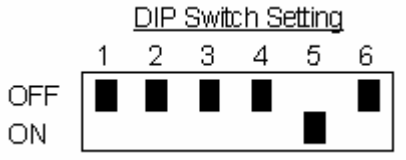
3: Trigger delay output is externally synchronized signal (100μs fixed pulsation width)

The product can be used as a conventional 12-V DC or 24-V DC power supply. Continuous and strobe light options are available in either voltage.

2-2 Voltage Selector

12-V DC or 24-V DC output may be selected using the voltage selector on the back panel. However, please make sure that the product is turned OFF before switching outputs. The voltage selector has a locking mechanism that requires the switch itself be lifted up to change voltages. 12V DC output is from connector L1, and 24V DC from connector L2. (When 12V DC is selected, 12V DC is also output from connector L2.)

2-3 Continuous Light

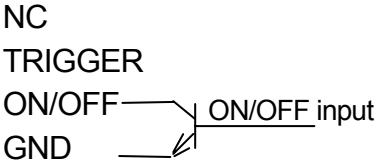


Refer to other sections for the settings at # 2, # 3, # 5, and # 6.
DIP switch # 4 is not used for continuous lighting.
The # 5 setting depends on what was set when the power was turned ON. Changes made after the power is turned ON are ignored.
Light control may be set within 256 levels combining coarse and rotary dials.

Continuous Light Control

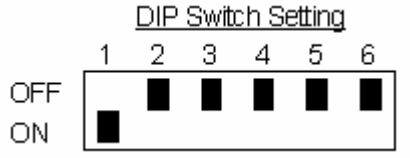
Light intensity date: (Coarse x 16 + Fine) x 100/255 [%] (Note1)
Note: however, that the fine rotary dial controls the strobe delay time rather than light control when DIP switch # 6 is ON. (Refer to 2-5)
The PULSE WIDTH switch does not work for continuous light.

Terminal Block ON/OFF Wiring



When the DIP switch # 5 is "OFF" and the ON/OFF signal is ON, the light turns on.
Conversely, when the DIP switch # 5 is "ON" and the ON/OFF signal is OFF, the light turns on.

2-4 Strobe Light



Refer to other sections for the settings at # 2, # 3, # 4, and 6.
Dip switch # 5 is not used in strobe light.
Light pulse width: 20, 40, 60, 80,100,140,180, 260, 400, 500, and 1,000μs or 3, 5, 8, 10, and 33 ms (±10 ms).
Overdrive is activated with 3 to 4 times the light output for light pulse width of 1,000μs or less.

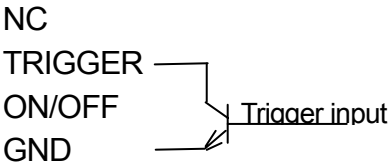
Strobe Lighting Control

When the light pulse width more than 3 ms, output voltage becomes for normal continuous light and overdrive becomes disabled. Strobe light can be adjusted by 128 levels combining the coarse and fine rotary dials.

Light intensity date: (Coarse x 16 + Fine) x 100/255 [%] (Note1, Note2)
Note: however, that the fine rotary dial controls strobe delay time rather than light control when DIP switch # 6 is ON. (Refer to 2-5)

Notes
1: This is a theoretical value. It varies by loads and extension cables, especially around 0% as well as 100% setting.
2: Strobe light resolution becomes half to 128 levels. (128 levels: 0,1,3,5,7,…,255)

Trigger Input Wiring



When DIP switch # 4 is OFF and trigger input signal is ON, strobe light turns ON.
Conversely, when DIP switch # 4 is ON and trigger input signal OFF, strobe light turns ON.

2-5 Light Delay Time

When DIP switch # 6 is ON, the delay time from the trigger input until the light turns ON, may be set by fine rotary dial. In this case, only the coarse rotary dial is used for light control (error ±10μs).

Fine	Delay [μs]	Fine	Delay [μs]
0	10	8	300
1	30	9	500
2	60	A	750
3	80	B	1000
4	100	C	2000
5	150	D	4000
6	200	E	8000
7	250	F	10000

2-6 External Control

External control mode may be selected by turning DIP switch # 2 (remote) ON.
The position of DIP switch # 3 determines whether bit-parallel or RS-232C be used for external control.

(1) Bit-parallel (DIP Switch # 3: OFF)

The15-pin D-sub connector on the back panel may be used for light control and ON/OFF control.
The rotary dials on the front panel are enabled when pin #9 (INT/EXT) is OFF. When pin #9 is ON, light control and ON/OFF control are based on the following input status conditions.

Control Bit Configuration

Bit	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12
Construction	(LSB) Light intensity data (0 to FF) (MSB)								INT/ENT	/WR	OFF/ ON	TRIG

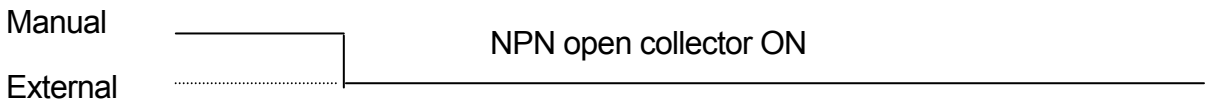
(2) Signal Logic

Data and control bits are negative logic bits (active LOW: maximum light intensity date when all bits are LOW).
Use a driver IC, open collector, or other device to output the signal.

(3) External/manual control selector

This selector is used to switch to external control mode. (The rotary dials are disabled in this mode.)

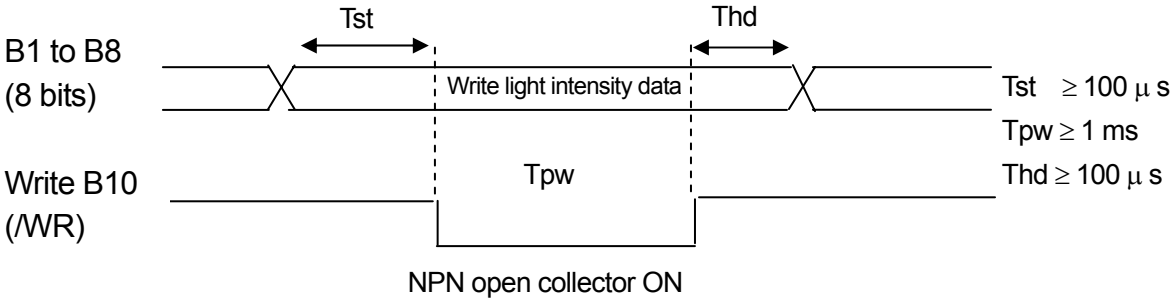
External Control Mode Selection - B9 (INT/EXT)



Note: External control mode cannot be selected if DIP switch # 2 is OFF.

(4) Data Entry Sequence

Note: Data can be written in external control mode, but not in manual control mode.



(i) The light intensity data (B1 to B8) outputs in negative logic (maximum light intensity date with all bits LOW).
(ii) It outputs the write bit (data written in 1 ms max.).

(5) Other I/O and Voltage Levels

The same ON/OFF signal (B11) and trigger signal (B12) that are input from the terminal block signals can be input from the D-sub connector. With strobe light, the delay trigger signal (B13) that is used to synchronize the external device set via RS-232C and the pulse light signal (B14) that is used to confirm light are output at active LOW (5 V-CMOS level).

The pulse width of the delay trigger signal is always 100μs regardless of the pulse width of the trigger input. The bit-parallel control signal is a 5V-CMOS level input (LOW: 1.35V max.; HI: 3.15V min.)

2-7 RS-232C External Control

Refer to 9.RS-232C External Control for details on external control via RS-232C.

3. Operating Instructions

3-1 Connection

Turn the power off.

Connect the LED light cable to the output connector on the power supply back panel.

Ground the FG terminal of the 10-W model with 0.5 to 1.25 sq wire (AWG20 to AWG16).

Connect power cord to wall socket.

When using external control, the control signal should be connected to the back panel connector.

3-2 Operation and Output Voltage Settings

It sets the mode selector DIP switch on the front panel and the voltage selector switch on the back panel.

3-3 Turn the power on.

Turn ON the Power switch.

3-4 Light Control

In manual mode, the light intensity can be controlled with the coarse and fine rotary dials.

The pulse width can be set for strobe light in this mode from the pulse width setting switch.

Note: Press the test button on the front panel to manually check the strobe when strobe light is selected.

4. Connectors

4-1 Output connector: SM connector (mfd. by JST)

Pin No.	12 V output	24 V output	Output with fan (Note)
1	OUT+(+12V)	OUT+(+24V)	OUT+(+24V)
2	OUT-	NC	OUT+(+12V)
3		OUT-	OUT-
4			Fan GND
Connector	SMP-02V-BC	SMP-03V-BC	SMP-04V-BC

Note) With fan: L1/L2 (FAN) output connector for lighting with a fan

Output with fan is not available when strobe (ON) is selected with mode selector DIP switch # 1.

4-2 External interface connector: (15-pin D-sub plug with M2.6mm Screws)

Use a shielded cable no longer than 3m for the control line.

Pin No.	Color of the Optional Cable (Note)	Signal
1	Black	Light intensity date B1[LSB]
2	White	Light intensity date B2
3	Red	Light intensity date B3
4	Green	Light intensity date B4
5	Yellow	Light intensity date B5
6	Brown	Light intensity date B6
7	Blue	Light intensity date B7
8	Purple	Light intensity date [MSB]
9	Gray	External control (INIT/EXT) B9
10	Pink	Light intensity data write (/WR) B10
11	White/Black	ON/OFF control (ON/OFF)
12	Red/Black	Trigger input (/TRIG) B12
13	Green/Black	Trigger delay output (TDLY) B13
14	Yellow/Black	Pulse output (FLSH) B14
15	Brown/Black	Signal GND

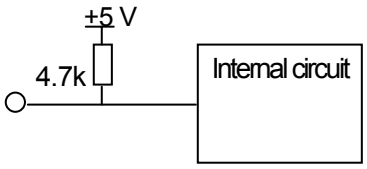
Note) Optional cable for external control: EXCB2-B3 (3m long cable with one end cut.)

4-3 RS-232C Connector 9-pin D-sub plug with inch screws

Use a shielded crossover cable no longer than 3 m for the control line.

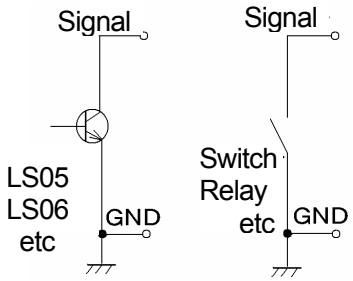
Pin No.	Signal
1	NC
2	RXD
3	TXD
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	NC

5. PDS Side Input Circuit (Negative logic)



Light intensity data: B1 – B8
Control signal: INT/EXT, WR, OFF/ON, TRIG
Use with driver IC or NPN open collector.
(Max. allowable input voltage: 6 V)

6. Recommended control signal drive circuits: open collector photo-coupler, photo-MOS relay



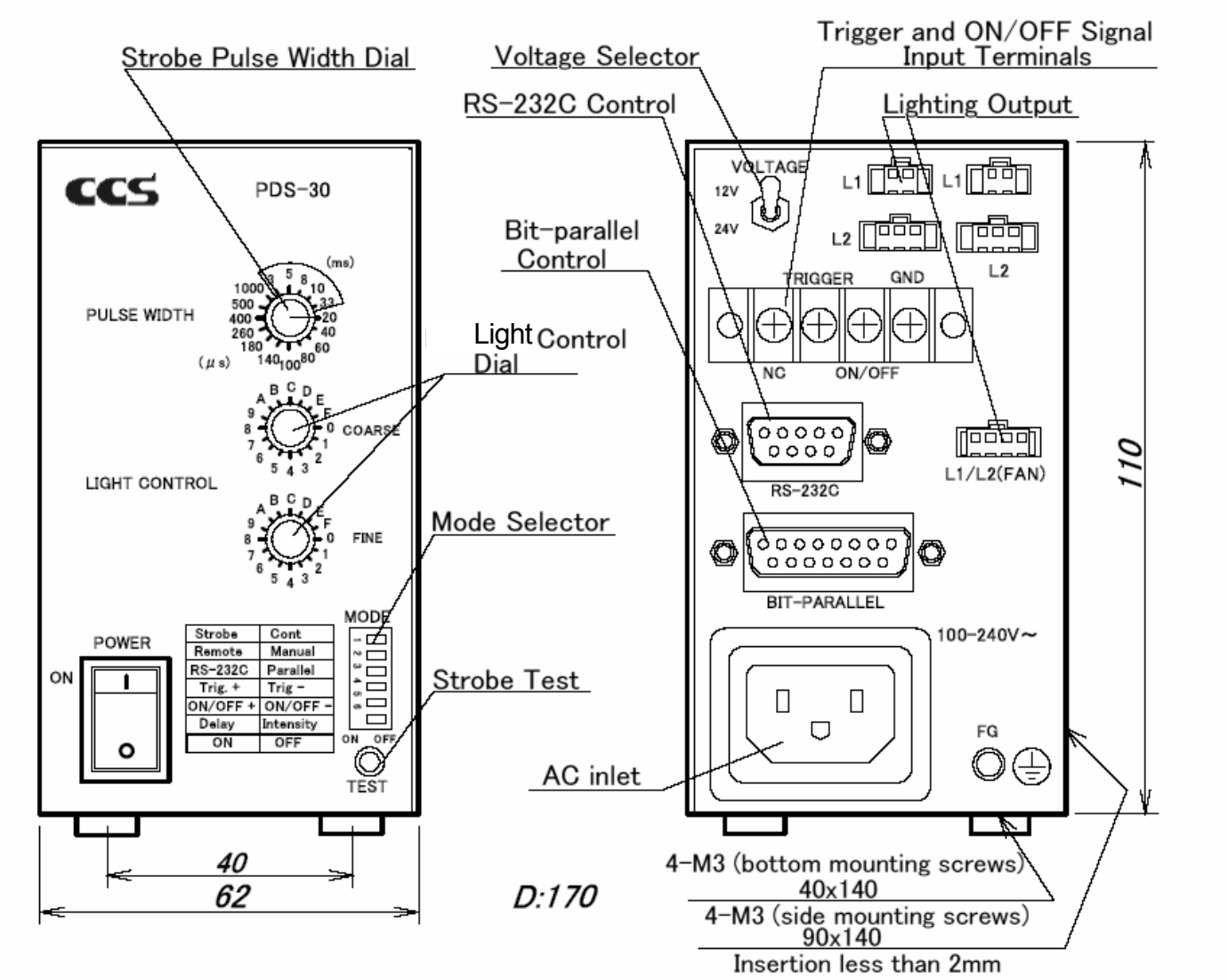
When using the product in a noisy environment, we recommend that you isolate the signal and ground lines from the control unit with photo-couplers or photo-MOS relays. Any element that supplies around 10mA can be used to drive the circuit.

7. Care and Handling

- Turn OFF the Power Supply and unplug from the wall socket before handing.
- Do not scratch the product by handling it with a hard object.
- Do not let water or cleanser enter the unit.
- Use soft cloth lightly soaked with water, mild soap, or alcohol, and wipe gently.
- Kerosene, organic solvent, and other chemicals should not be used.

8. Dimensional diagrams

8-1 PDS-30



9. RS-232C External Control

9-1 RS-232C External Control (9-pin D-sub)

Turning DIP switch # 2 and # 3 ON enables external control via RS-232C. By sending external commands that conform to the transmission specifications, will enable to control the power supply with a PC or other external devices.

9-2 Transmission specifications

Data bit length:	8 bits	Stop bits:	1 bit
Parity check:	None	Baud rate:	9,600 bps

9-3 Command list

The following commands can be used.

Type	Header code	Name	Function
Transmission	**V**	Version confirmation command	It returns the version number of the loaded device software.
	R	Reset command	It resets the transmission sequence that is currently executing.
	Q	Query command	It returns the status of all settings.
Setting	**T**	Trigger output delay setting command	It sets the delay time for external output of the timing signal for strobe light.
	S	Strobe light width setting command	It sets the pulse width for strobe light.
	D	Strobe delay setting command	It sets the delay time for strobe light.
	F	Pulse width setting command	It sets the duty ratio for pulsed light width. Light control for both Continuous and Strobe light mode.

9-4 Channels

It can be set from 00 to 15 (16 channels max.). A channel number available on a single-channel power supply is 00.

9-5 Command Description

V: Version Confirmation Command

Name	Version confirmation command						
Header code	**V**						
Function	It returns the version number of the loaded device software.						
Command	**@**	**99**	**V**	**FF**	**CR**	**LF**	
	Header	Channel		Checksum	Delimiter		
Response							
OK command	**@**	**99**			**FF**	**CR**	**LF**
	Header	Channel	Version No.		Checksum	Delimiter	
NG command	**@**	**99**	**N**	**9**	**FF**	**CR**	**LF**
	Header	Channel		Error No.	Checksum	Delimiter	

R: Reset Command

Name	Reset command					
Header code	**R**					
Function	It resets the transmission sequence that is being executed, clears all transmission buffers, and re-initializes transmissions. Pulse Duty Setting: 100% (255) Strobe Pulse Width Setting: 20μs Strobe Delay Setting: 0μs Trigger Output Delay Setting: 0μs					
Command	**@**	**99**	**R**	**FF**	**CR**	**LF**
	Header	Channel		Checksum	Delimiter	
Response						
OK command	No return command					
NG command	No return command					

Q: Query Command

Name	Query command							
Header code	**Q**							
Function	It returns the status of all settings.							
Command	**@**	**99**	**Q**	**FF**	**CR**	**LF**		
	Header	Channel		Check sum	Delimiter			
Response								
OK command	**@**	**99**	**A**	**999**	**99999**	**99999**	**99999**	→
	Header	Channel		Light pulse width	Strobe light width	Strobe light delay time	Trigger output delay time	
	→		**FF**	**CR**	**LF**			
			Check sum	Delimiter				
NG command	**@**	**99**	**N**	**9**	**FF**	**CR**	**LF**	
	Header	Channel		Error No.	Check sum	Delimiter		

T: Trigger Output Delay Setting Command

Name	Trigger output delay setting command							
Header code	**T**							
Function	It sets the delay time of external output timing signal for strobe light.							
Command	**@**	**99**	**T**	**99999**	**R/W**	**FF**	**CR**	**LF**
	Header	Channel		Output delay time	Write flag	Checksum	Delimiter	
Response								
OK command	**@**	**99**	**O**	**FF**	**CR**	**LF**		
	Header	Channel		Checksum	Delimiter			
NG command	**@**	**99**	**N**	**9**	**FF**	**CR**	**LF**	
	Header	Channel		Error No.	Checksum	Delimiter		

The output delay time may be set from 0μs to 10,000μs.
Although it can be set increment of 1μs as setting, it will actually be rounded in approximately 20μs increments at 300μs or lower and 100μs increments at 320μs or higher.

D: Strobe Light Delay Setting Command

Name	Strobe light delay setting command							
Header code	**D**							
Function	It sets the delay time for strobe light.							
Command	**@**	**99**	**D**	**99999**	**R/W**	**FF**	**CR**	**LF**
	Header	Channel		Strobe light delay time	Write flag	Check sum	Delimiter	
Response								
OK command	**@**	**99**	**O**	**FF**	**CR**	**LF**		
	Header	Channel		Checksum	Delimiter			
NG command	**@**	**99**	**N**	**9**	**FF**	**CR**	**LF**	
	Header	Channel		Error No.	Checksum	Delimiter		

Strobe light delay time may be set from 0μs to 10,000μs.
Although it can be set increment of 1μs as setting, it will actually be rounded as shown at the "2-5 Light Delay Time".
(The delay time can not be set with 1μs step)

S: Strobe Light Width Setting Command

Name	Strobe Light Width Setting command							
Header code	**S**							
Function	It sets the pulse width for strobe light.							
Command	**@**	**99**	**S**	**99999**	**R/W**	**FF**	**CR**	**LF**
	Header	Channel		Strobe light width	Write flag	Checksum	Delimiter	
Response								
OK Command	**@**	**99**	**O**	**FF**	**CR**	**LF**		
	Header	Channel		Checksum	Delimiter			
NG Command	**@**	**99**	**N**	**9**	**FF**	**CR**	**LF**	
	Header	Channel		Error No.	Checksum	Delimiter		

Strobe light width may be set from 20μs to 33,000 μs.
Although it can be set increment of 1μs, it will actually be rounded as shown at "2-4 Strobe Light". (Strobe light width can not be set with 1μs increment)

F: Light Pulse Width Setting Command

Name	Light Pulse Width Setting Command							
Header code	**F**							
Function	It sets the duty ratio for pulsed light width.							
Command	**@**	**99**	**F**	**999**	**R/W**	**FF**	**CR**	**LF**
	Header	Channel		Light pulse width	Write flag	Check sum	Delimiter	
Response								
OK command	**@**	**99**	**O**	**FF**	**CR**	**LF**		
	Header	Channel		Checksum	Delimiter			
NG command	**@**	**99**	**N**	**9**	**FF**	**CR**	**LF**	
	Header	Channel		Error No.	Check sum	Delimiter		

Light intensity date 0 to 255; the pulse duty ratio varies within 0 to 100% expressed in incremental value of100% divided by 256.
In case of Strobe Mode, the value halves to 128 increments. (0,1,3,5,7,….,255)

(Notes)

Error Numbers

Error numbers are defined as follows:

1: Faulty command error
2: Check error
3: Setting out-of-range error

Notation

999: Specify numbers in decimal.
FF: Specify numbers in hexadecimal.
R/W: Always set *write data to flash memory*. (Note)
Select R for write prohibited and W for write enabled.
Settings cannot be saved when write prohibited is selected.

Note) Endurance / Data retention: 1 million cycles / 10 years

Checksum

Checksum is a character string, which has been converted to ASCII, containing total sum of lower-order 1-byte values up to a checksum position.

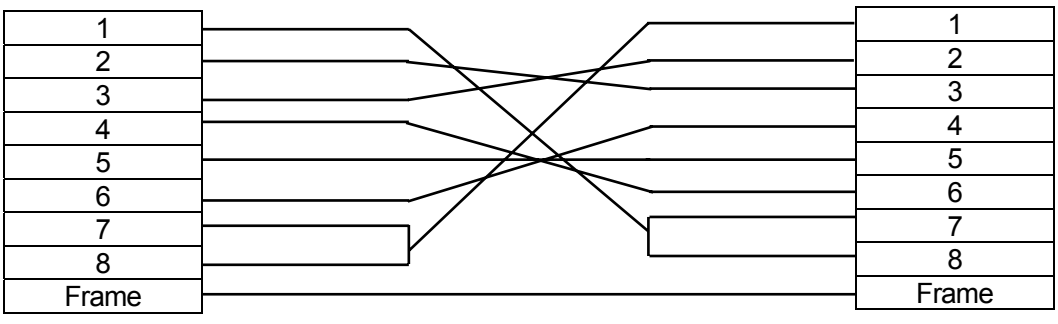
Example

Character	ASCII code (HEX code)
@	40H
L	4CH
9	39H
9	39H
9	39H
Total	137H
	↓
Checksum	37

9-6 Serial Cables

Use 9-pin D-Sub serial cable in order to connect to external devices.
The serial cable should be a cross cable that is 15 m or shorter and fully shielded.
(We recommend: C06-09F-09F-CROSS-910 (3 m) [made by Misumi Group Inc.])
Noise will be introduced with a longer cable, resulting in possible transmission errors.
(A cable shorter than 3m is recommended)

9-7 Cable Connections



9-pin D-sub socket
(inch screws)
PC and PLC side

9-pin D-sub socket
(inch screws)
PDS power supply side

⚠ General Precautions Regarding to External Control

1. Bit Parallel Input Voltage

   The input voltage is 1.35V maximum for “LOW” and 3.15V minimum for “HI”. Faulty operation may occur if a open collector output is two-stage, and a surge absorbing diode connected in series. Because the residual voltage goes up as high as 1.5V when the power is turned on. Meanwhile, the voltage may drop (pull-up resistance x IL) and “HI” can no longer be maintained if the leakage current (IL) is high when the open collector turns off.

2. Controlling Output Units

   (2-1) TTL/CMOS Output Units

   The load voltage often ranges from 10.2 to 26.4V DC when sequencers use general-purpose transistor output units. TTL/CMOS output units are ideal for this application because they operate on +5 V and their residual voltage is guaranteed never more than 0.4 V.

   (2-2) Separate Power Supply Control

   A multi-bit output unit that is used to control both the PD power supply and the power system drive unit makes the power system susceptible to noise because of the wiring involved. Provide a separate power supply control unit to isolate the power supply from the power system.

3. Entry Sequence

   The setup and hold time takes 100μs and the write pulse width is 1ms for the data entry sequence described in this instruction guide. These figures, however, do not include the control circuit ON/OFF response time or delay time variations between output channels. The PLC device and photo coupler output for image processing also have relatively slow ON and OFF response times of 0.5ms and 1ms, respectively. Therefore, all the factors such as power supply setup time, hold time with the output circuit response time, and delay time variations between channels, must be considered in data entry.

4. Writing Light Intensity Data

   There are some applications where light intensity data is written once when the power is turned on and thereafter offer only lighting ON/OFF control. It is always safer to write light intensity data every time even in those applications if the processing time allows it.

5. Wiring and Safety Measures

   (5-1) Ground Wire

   Wire the COM (GND) from the Output Unit directly to the power supply. Otherwise noise becomes a factor and faulty operation is likely to occur. This happens because the GND level is raised by COM current from somewhere other than the power supply if the COM (GND) is relayed by wiring it to a terminal block and then branched it off for image processing, motor valve control, or the PD power supply.

   (5-2) Measures to Prevent Faulty Operation

   If synchronization with motors, valves or other peripheral devices leads to faulty operation, then move the external control line, lighting extension cable, or power supply away from the motor, valve, or respective drive line causing the problem. Other possibilities for improving noise protection include adding a ferrite core near the power supply unit or using shielded cable, twisted pair cable, or cable with high EMI noise immunity.

When the luminosity of light fluctuate due to excess amount of noise, please contact CCS.

10. Glossary

1. Parallel
   Method which is used to send multiple data simultaneously, and its interface.
2. Serial
   Method which is used to send data one bit per cable at the time. Antonym of Parallel.
3. RC-232C
   Serial interface standard which is used to majority of PC and peripheral equipment.
4. D-Sub
   One of the types of connector which is used for electrical communication. It has flat trapezoidal shape topographical profile, and two rows of pins. There are few kinds of them such as 9-pins, 15 pins, 25 pins, 50pins, etc.
5. AWG (American Wire Gauge)
   Standard of conductive wire which diameter is divided by certain ratio, and numbered.
   i.e.) AWG16: 1.290mm AWG18: 1.020mm AWG20: 0.812mm
6. FG (Frame Ground) connector
   Connector which is used to place casing.
7. Parity check
   Error detecting method which adds extra 1 bit to data digit by computer and makes a situation when the number of 1's becomes either odd or even numbers.
8. baud rate
   Unit of communication modulating speed
9. Checksum
   algorithm used to detect error
10. Delimiter
    a character that marks the beginning or end of a unit of data
11. ASCII Code
    American standard code for information exchange legislated by ANSI

11. RoHS Directive

11-1 EU RoHS Directive

The RoHS Directive is short for the "restriction of use of certain hazardous substances in electrical and electronic equipment." As a directive, it restricts the use of specific hazardous substances for new electrical and electronic equipment marketed in the EU on or after July 1, 2006, and restricts the use of six substances, which are (1) lead, (2) mercury, (3) cadmium, (4) hexavalent chromium, (5) polybrominated biphenyl (PBB), and (6) polybrominated diphenyl ether (PBDE).

Standards for "RoHS Directive-Compliant Products"

Lead	1000ppm Min
Mercury	1000ppm Min
Cadmium	100ppm Min
Hexavalent chromium	1000ppm Min
PBB	1000ppm Min
PBDE	1000ppm Min

(Items that are exempted in the RoHS Directive are excluded from these standards.)

11-2 China RoHS Directive

China RoHS Directive is formally known as "Management Methods for Controlling Pollution by Electronic Information Products", which was implemented on March 1, 2007 in China. Same as EU RoHS Directive, this regulation restricts the usage of six substances such as lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyl (PBB), and polybrominated diphenyl ether (PBDE). This regulation requires electronic information products which are manufactured or imported, and sold in China, to clearly disclose contents of the 6 restricted substances listed below.

Name and amount of toxic and hazardous substances or elements, which products contain

Usage Deadline for Environmental Protection	Product name	Toxic or Hazardous Substances and Elements					
		Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent chromium (Cr(VI))	PBB	PBDE
	Power supply for LED Lights	×	○	×	○	○	○

○:Indicates that this toxic or hazardous substances contained in all the homogeneous materials for this part, according to SJ/T11363-2006 is within the limit requirement.

×:Indicates that this toxic or hazardous substance contained in all the homogeneous materials for this part, according to SJ/T11363-2006, is over the limit requirement.

(✳)Lead and cadmium are excluded in EU RoHS.

Usage deadline for environmental protection

The number used in this logo is based on “Management Methods for Controlling Pollution by Electronic Information Products” and related regulations from People’s Republic of China. It shows the product usage duration in years for environmental protection. After finishing a product usage, the product need to be re-used or discard appropriately following local law and regulations, complying with safety and usage caution.

产品中有毒有害物质或元素的名称及含量

环保使用期限	产品	有毒有害物质或元素					
		铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
	LED照明专用电源	×	○	×	○	○	○

○：表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T11363-2006 标准规定的限量要求以下。

×：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T11363-2006 标准规定的限量要求。

（注）铅和镉中的“×”，因欧洲RoHS没限定，故用“○”表示。

环保使用期限

此标志的数字是根据中华人民共和国电子信息产品污染控制管理办法以及有关标准等，表示该产品的环保使用期限的年数。

遵守产品的安全和使用上的注意，在产品使用后采取适当的方法根据各地法律，规定，回收再利用或进行废弃处理。

12. Warranty Information

Warranty period: Two years (one year for radiant quantity), starting from CCS Inc. shipping date.

CCS Inc. will repair or replace the product free of charge if it should fail to function or if the radiant quantity of the product should drop to 50% or less of its initial radiant quantity within the specified warranty period. If either of these conditions occurs, please take the product to your CCS sales representative.

Warranty Terms

1. CCS Inc. will repair or replace the product free of charge if it should fail to function under normal use in accordance with the Instruction Guide and other written cautions during the indicated warranty period of two years
2. CCS Inc. will repair or replace the product free of charge if its radiant quantity should drop to 50% or less of its initial radiant quantity under normal use in accordance with the Instruction Guide and other written cautions during the indicated warranty period of one year.
3. CCS Inc. will charge a repair fee under the following conditions :
   1) If the product has been subjected to misuse, unauthorized repairs, or modification from its original design.
   2) If the product has been damaged from impacts due to inappropriate handling
   3) If damage to the product results from external causes including accidents, fire, pollution, riots, communication failures, earthquakes, thunderstorms, wind and flood damage, or any other act of providence, or from any extraordinary conditions such as electrical surges, water leakage, condensation, or the use of chemicals
   4) If the damage results from connection to any power supply or to any equipment which CCS Inc. does not manufacture or does not specify for use

This warranty information provides the scope of CCS's product warranty within the specified period, and does not indicate or imply any further guarantee beyond the warranty terms.

Contact CCS for inquiries or information on repairs to the product after the expiration of the warranty.

CCS Inc.

Head Office
Shimodachiuri-agaru, Karasuma-dori
Kamigyo-ku, Kyoto 602-8011 Japan
Phone: +81-75-415-8284, Fax: +81-75-415-8278

http://www.ccs-grp.com
intlsales@ccs-inc.co.jp

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